

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-81. (Canceled)

82. (Previously Presented) An apparatus, comprising:
a manipulandum moveable in at least two degrees of freedom;
a linkage coupled to the manipulandum, the linkage including a plurality of elements, at least a subset of elements from the plurality of elements being flexibly coupled to each other and moveable in at least one of said two rotary degrees of freedom;
and
at least one sensor configured to detect at least one of a position and a movement of the manipulandum in the at least two degrees of freedom and output a sensor signal based on the detected at least one of the position and the movement.

83. (Previously Presented) The apparatus of claim 82, further comprising an actuator coupled to the linkage, the actuator configured to output via the subset of elements a feedback force along at least one of the at least two degrees of freedom.

84. (Previously Presented) The apparatus of claim 82, wherein the linkage includes:

a ground member configured to be coupled to a ground surface;
a first extension member and a second extension member, the first extension member and the second extension member being coupled to the ground member; and

a first central member and a second central member, the first central member having an end coupled to the first extension member, the second central member having an end coupled to the second extension member, the first central member and the second central member being coupled to each other at ends opposite the ends coupled to the first extension member and the second extension member.

85. (Previously Presented) The apparatus of claim 82, wherein the linkage includes:

a ground member configured to be coupled to a ground surface;

a first extension member and a second extension member, the first extension member and the second extension member being coupled to the ground member; and

a first central member and a second central member, the first central member having an end flexibly coupled to the first extension member, the second central member having an end flexibly coupled to the second extension member, the first central member and the second central member being coupled to each other at ends opposite the ends coupled to the first extension member and the second extension member.

86. (Previously Presented) The apparatus of claim 82, wherein the linkage includes:

a ground member configured to be coupled to a ground surface;

a first extension member and a second extension member, the first extension member and the second extension member being coupled to the ground member; and

a first central member and a second central member, the first central member having a first end coupled to the first extension member, the second central member having a first end coupled to the second extension member, a second end of the first central member and a second end of the second central member being coupled to each other,

the ground member being rotatably coupled to the first extension member and the second extension member by bearings, the bearings configured to permit rotation of the first extension member and the second extension member.

87. (Previously Presented) The apparatus of claim 82, wherein at least one element from the subset of elements is narrower in a dimension in which that element is configured to flex, and is wider in other dimensions in which that element is configured to be substantially inflexible.

88. (Previously Presented) The apparatus of claim 82, further comprising:
a first actuator coupled to the linkage, the actuator configured to output via the subset of elements a feedback force in at least one of the at least two degrees of freedom based on the sensor signal; and

a second actuator coupled to the ground member, the second actuator being configured to apply a feedback force in at least one of the at least two degrees of freedom based on the sensor signal, the feedback force associated with the second actuator being different from the feedback force associated with the first actuator.

89. (Previously Presented) The apparatus of claim 82, further comprising an actuator coupled to the linkage, the actuator configured to output via the subset of elements a feedback force along at least one of the at least two degrees of freedom, the actuator including a voice coil actuator configured to impart the feedback force on the manipulandum.

90. (Previously Presented) An apparatus, comprising:
a manipulandum moveable in at least two rotary degrees of freedom about axes of rotation with respect to a reference;
a first member coupled to the manipulandum;
a second member flexibly coupled to the first member; and
a third member flexibly coupled to the first member

91. (Previously Presented) The apparatus of claim 90, wherein the first member and the second member are coupled to an intermediate member that is coupled to the manipulandum.

92. (Previously Presented) The apparatus of claim 90, wherein at least one of the first member, the second member and the third member has a first dimension about which the at least one member is configured to flex, and has a second dimension about which the at least one member is configured to be substantially inflexible.

93-101. (Canceled)

102. (Previously Presented) The apparatus of claim 90, further comprising:
an actuator coupled to the manipulandum, the actuator configured to output a feedback force along at least one of the at least two degrees of freedom.

103. (Previously Presented) The apparatus of claim 90, further comprising:
a sensor configured to detect a position of the manipulandum along at least one of the at least two degrees of freedom and output a sensor signal based on the detected position.

104. (Previously Presented) The apparatus of claim 90, wherein the manipulandum includes one of a simulated surgical tool, a stylus, or a joystick.